PENTAX P3, P30

Similar models: P5 (mechanically the same). Super Program and A3000 (electronically similar)

Product #: P30 (domestic version) — 25300; P3 (American version) — 25301

Batteries: 2ea S76 (negative ground)

Fig. I—top cover removed

Fig. 2—bottom cover removed, wind lever held partially advanced

Fig. 3—top view, wind side

Fig. 4—front view, mirror box removed

Fig. 5—mirror box. bottom view

Fig. 6—underside of PC board T100 (Ilex)

Fig. 7—top view of wind side, mirror box removed

Fig. 8—bottom view of wind side, ratchet wheel removed

Fig. 9—top view of wind side, winding seal removed

Fig. 10—top view of wind side, wind shaft removed

Fig. 11—underside of top mechanism plate — reassembly position of pawl

Fig. 12—top view of wind side, top mechanism plate removed

Fig. 13—sprocket-hook timing

Fig. 14—sprocket timing

Fig. 15—counter-gear timing

Fig. 16—test points, underside of PC board T100 (flex)

Fig. 17—lest points, main-switch block

Fig. 18—test points, LED block

Fig. 19—wiring variations, early style PC board T100

Fig. 20—test circuit for optical encoder

Fig. 21—wiring pictorial and test points

ADJUSTMENT LOCATIONS:

Aperture-control voltage	A
Auto exposure	B
Focusing screen	C*
Wind-completion switch	D
Sprocket hook	E
Travel time. 2nd curtain	F
Travel time, 1st curtain	G
Timing switch (fast speeds)	H**
Shutter release	I

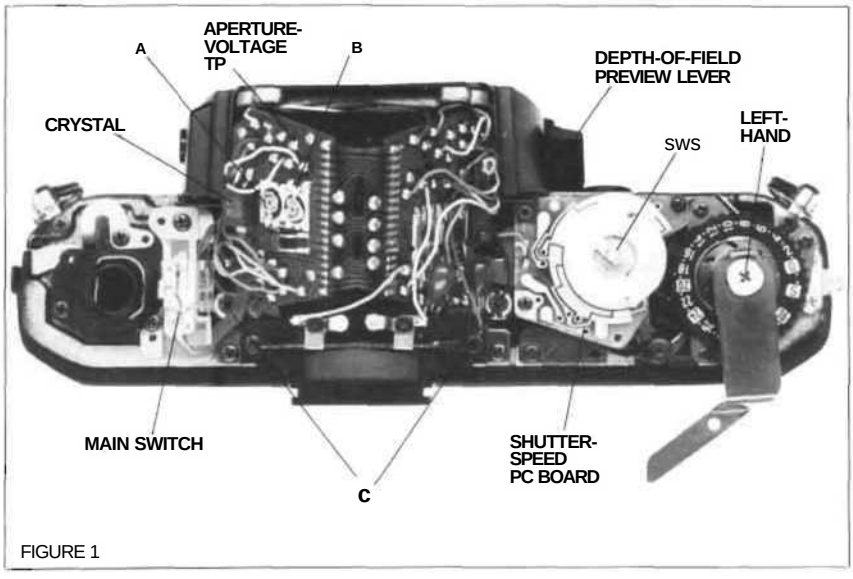


FIGURE 1

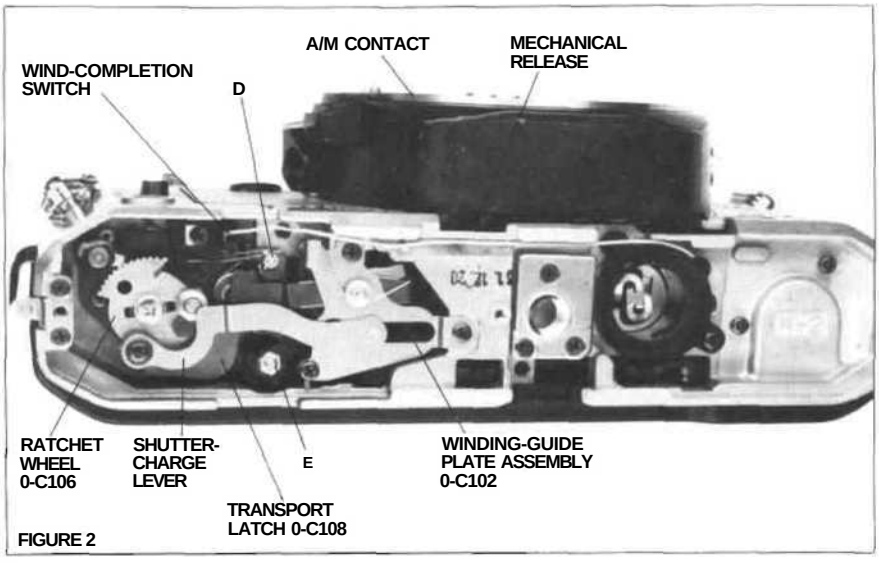


FIGURE 2

Not shown:

Aperture-value resistor. Variable resistor at back of front plate, wind side top (near mirror box).

Mirror angle. Hex nut on wind side of mirror box, under mirror (reach through lens opening).

•There are four adjustment points for the height and level of the focusing screen. To reach the two adjustments at the front, remove PC board T100 (flex). However, if the focus at the focusing screen is incorrect, you can make minor adjustments on the mirror angle. Use a 2.5mm hex key to turn the hex nut.

**If you adjust the timing switch. apply conductive paint between the timing-switch adjustment and the shutter mechanism plate to improve the ground.

ADJUSTMENT VALUES:

Curtain-travel time: 6.05 ± 0.3ms (21mm distance), 5.76ms (20mm distance)

Flange-focal distance: 45.46 ± 0.04mm (flange to film rails)

Aperture-control voltage: 500 ± l00mv P-P

Battery check: 2.45V — LEDs normal
2.35V — LEDs pulse on and off

Resistance, aperture-value resistor: 5.9K ± 10 ohms at f/8

Release point. 1st curtain: The 1st curtain should release when the mirror is I - 3mm from the porous-plastic strip at the top front of the mirror box.

Timing, sprocket hook: The clearance between the edge of the mirror-charge lever and the sprocket hook should be 0 - 0.2mm with the wind lever held fully advanced. Fig. I 3.

Wind-completion switch, space gap: 0.2 - 0.4mm

Release magnet: The space gap between the release-magnet armature and the release lever should be 0.1 - 0.3mm, Fig. 5. Adjust by shifting the release magnet.

Counter gear: When the counter-actuator lever is parallel to the ends of the camera body, the pie-shaped opening in the counter gear should face the rewind end of the body. Fig. 15.

Sprocket: Turn the sprocket toward the film aperture to take up the backlash. The sprocket should then be within the range shown in Fig. 14 — one pair of teeth pointing directly to the back of the camera or within 30 degrees toward the take-up spool side.

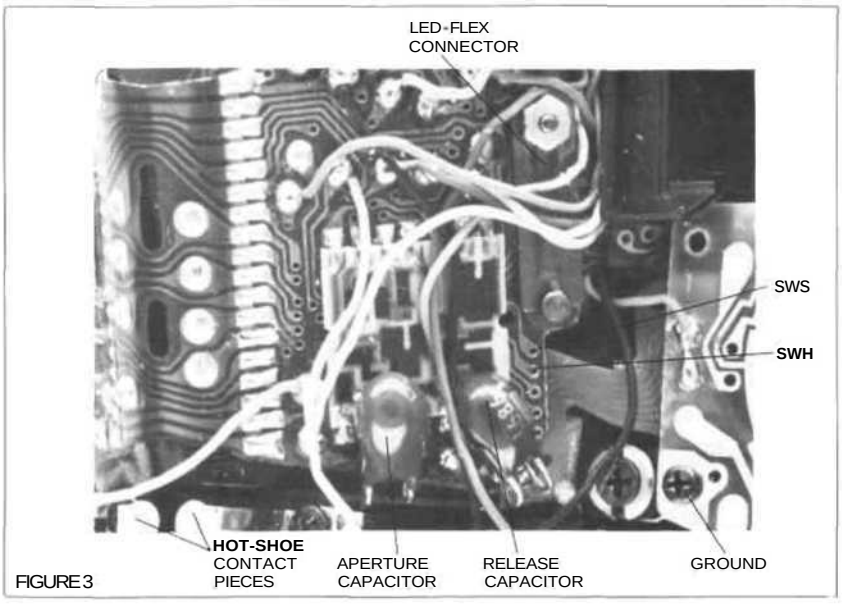


FIGURE 3

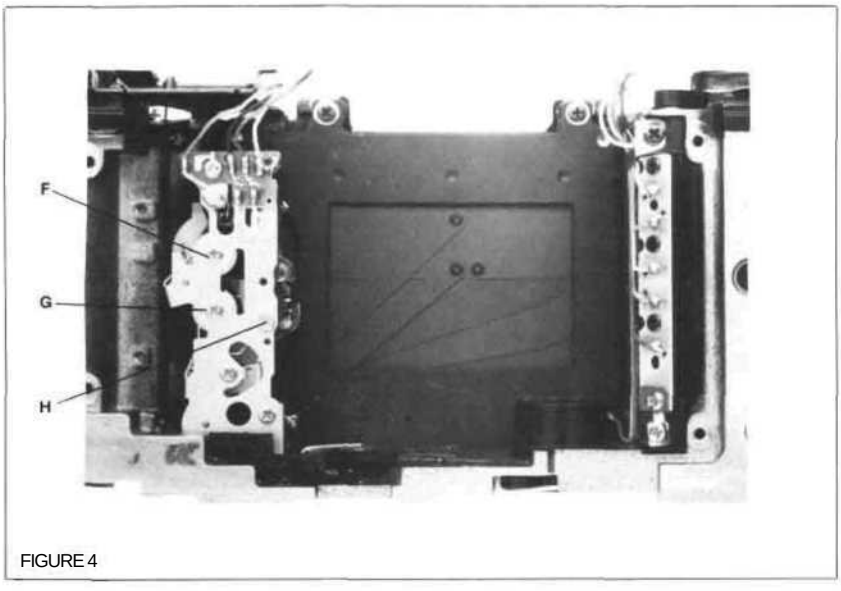


FIGURE 4

ADJUSTMENT PROCEDURES

1. Aperture-control voltage

   a. Connect a hook-up wire to the aperture-voltage TP, Fig. 1.

   b. Connect an oscilloscope between the hook-up wire and ground.

   c. Set the lens to "A."

   d. Set the scope to 2ms sweep time. 20mv vertical deflection. 10:1 on the probe.

   e. Release the shutter while observing the diaphragm opening. Make sure the diaphragm stops down smaller than f/2.8. If not, increase the light level to get a smaller aperture.

   f. Release the shutter while observing the scope trace. Note the peak-to-peak value of the sine wave Adjust A, Fig. I. for a value of 500 ± lOOmv (turn the wiper clockwise for a higher voltage).

2. Exposure

   a. Set the program mode (lens at "A," shutter speed at any setting).

   b. Check at EV12 (ISO 100). The aperture/shutter-speed combination sould be f/4 and 1/250.

   c. Adjust B , Fig. 1, for 0 EV error or for a shutter speed of 3.9ms. Tolerance — 3.5 - 4.3ms. Turn the wiper counterclockwise for a longer exposure, clockwise for a shorter exposure.

   d. Check at EV8. The aperture/shutter-speed combination should be 1/60 at f/2. Shutter-speed tolerance — 12.2 -19.9ms.

   e. Check at EV16. EVI0, and EV6. The exposure should be within ± 1.0EV at each light level.

3. Aperture-value (f-value) resistor

   a. Unsolder the two yellow wires of the aperture-value resistor from the flex PC board T100, Fig. 21. Connect an ohmmeter between the two wires.

   b. Set the lens to f/8. The resistance should be 5.9K ± 10 ohms.

   c. To adjust, remove the front-plate/mirror-box assembly. Then adjust the variable resistor at the wind side of the front plate.

4. Shutter (1st curtain) release

   a. Hold the bottom edge of the mirror and push the release button. Or, if power isn't being supplied to the circuit, mechanically release the mirror through the cutout shown in Fig. 2 (push the armature of the release

magnet toward the front of the camera).

b. Allow the mirror to move up slowly and note the mirror position when the shutter releases. The distance between the mirror and the porous-plastic light trap at the top of the mirror box should be 1 - 3mm.

c. If the distance isn't correct. remove the mirror box and bend the long arm of the shutter-release lever. Bend up the arm to make the shutter release sooner (distance between the mirror and the light trap too small). Bend down the arm to make the shutter release later.

OPERATING INSTRUCTIONS

1. Push forward the main-switch knob (top, rewind end) to operate camera. In the on position, the main-switch knob uncovers "I" on a red background. With the main switch in the off position, the shutter won't release and the LEDs won't turn on.
2. The finder LEDs turn on when you push the release button part way. The LEDs remain on 10 seconds after you let up the release button or after the exposure.
3. For program operation, set the lens to "A" (auto). The setting of the speed knob makes no difference. With the lens at auto, the "P" (program) LED turns on at the top of the display when you push the release button part way. The LED display also shows the shutter speed that will be automatically delivered. If the light conditions require a shutter speed faster than 1/1000. the "1000" LED flickers. If the light conditions require a shutter speed slower than 1 second, the "M" LED flickers.
4. For metered manual operation, set the lens to a manual f/stop. The setting of the speed knob now determines the shutter speed. A red "M" turns on at the top of the LED display to indicate manual mode. The shutter-speed LED that glows steadily indicates the setting you've selected. The flickering LED indicates the speed you should select for proper exposure.
5. At the bulb setting (manual f/stop), none of the LEDs turn on. At the flash-speed setting (I/100). only the "M" LED turns on.
6. For self-timer operation, hold down the button to the front of the main-switch knob. Then push the main-switch knob fully forward. The main-switch knob now uncovers "S.T." on a red background. When you depress the release button, the self-timer delays the mirror release for 12 seconds. The self LED (front, release-button side) flickers during the delay. The frequency of the LED oscillator increases just before the release. If the shutter is set to bulb and the lens is set to a manual f/stop, the self-timer won't operate (no action when you depress the release button).
7. The DX coding on the film cartridge automatically sets the film speed. There's no manual film-speed control. With no film — or with an uncoded cartridge — the film-speed setting is ISO 100.
8. The depth-of-field preview lever is at the front of the camera, release-button side. Fig. 1.
9. The "ML" (memory-lock) button (front, rewind side of lens mount) provides the auto-exposure lock on program mode. In the first version of the circuit, you must keep the memory-lock button depressed to lock the exposure. In the revised circuit, you don't have

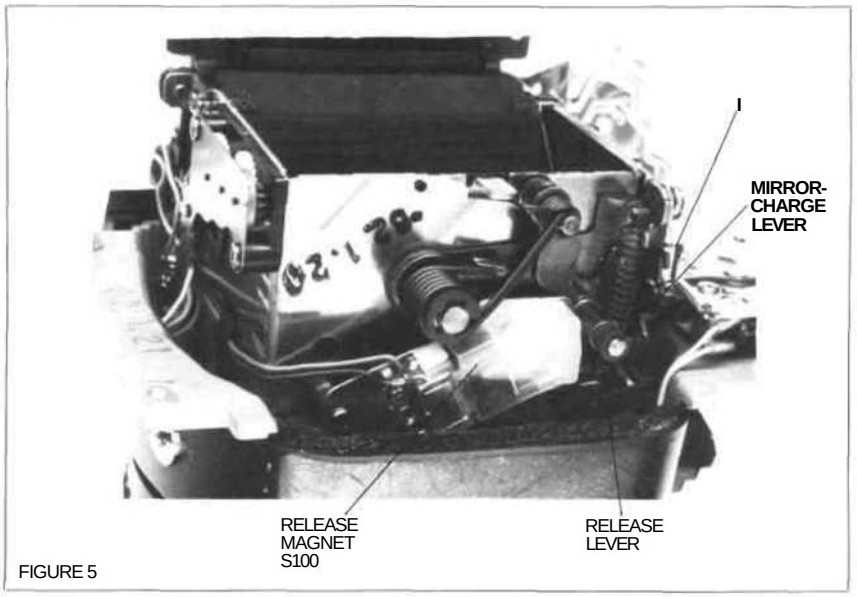


FIGURE 5

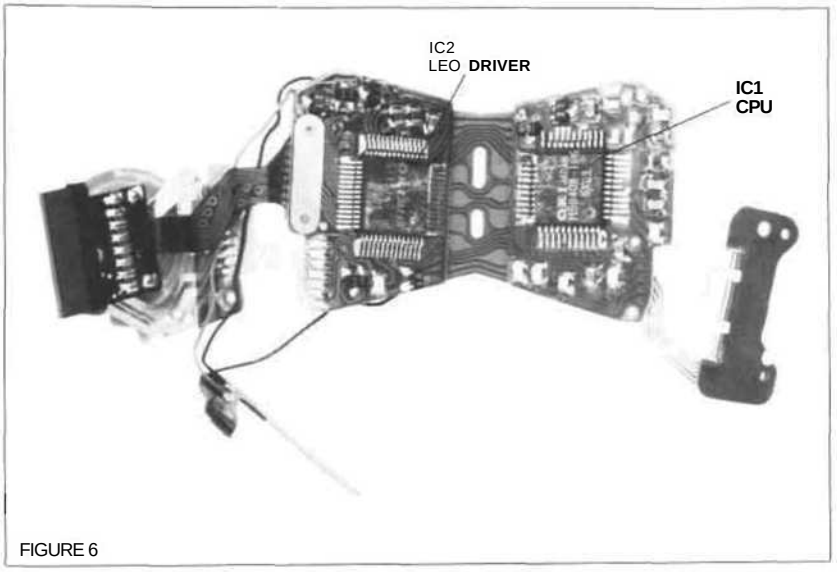


FIGURE 6

to hold in the memory-lock button. Depressing the memory-lock button turns on the LEDs and locks the exposure for 10 seconds. During the memory hold, the "P" LED and the shutter-speed LED flicker. On manual mode, the memory-lock button has no function. If you depress the memory-lock button on manual mode, the "M" LED and the shutter-speed LED flicker. However, the operation isn't affected.

10. The current version of the camera has a cable-release socket at the front, rewind side of the lens mount. Shorting across the cable-release socket releases the mirror.
11. The finder LEDs provide the low-battery warning. If the LEDs flash on and off, the batteries are getting low. If the batteries are too low for proper operation, the LEDs won't turn on and the shutter won't release.
12. The camera provides automatic flash control with any Pentax dedicated unit. In the manual mode, the flash sets the shutter speed to 1/100 if the shutter is set to 1/125 or faster. When the flash charges, a lightning-flash LED turns on in the finder along with "M." The shutter-speed LEDs turn out. If you set the shutter to 1/60 or slower, the shutter delivers the selected shutter speed. The lightning-flash LED, the "M" LED. and the shutter-speed LED noting the setting turn on when the flash charges. In the program mode, the flash sets both the shutter speed and the aperture. When the flash charges, the "M" LED and the lightning-flash LED turn on. The shutter delivers 1/100.

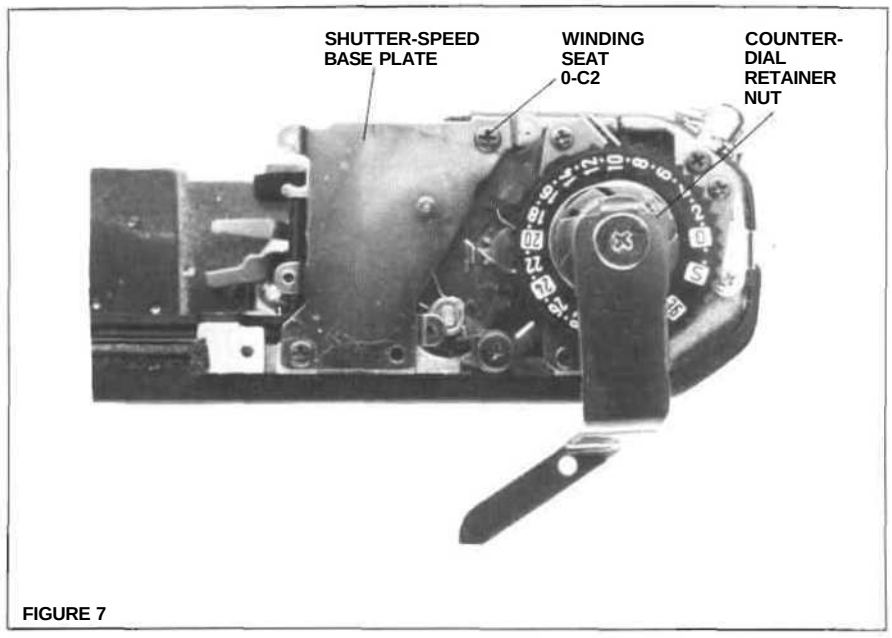


FIGURE 7

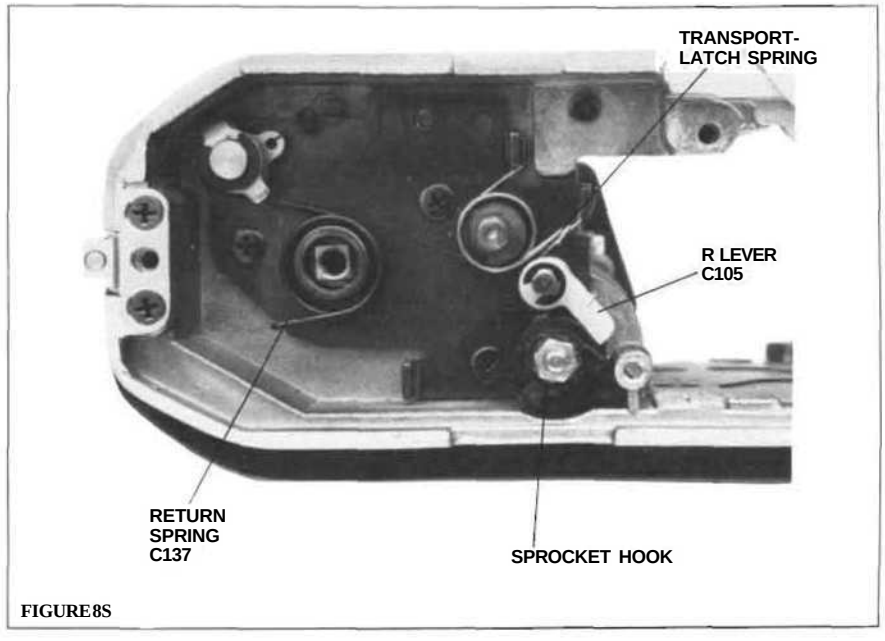


FIGURE 8S

SWITCH LOCATIONS AND FUNCTIONS

1. Main switch. Sliding switch, lop rewind end. Fig. I. In the on position. Fig. 17, the main switch connects battery voltage to PC board TI00. With the main switch in the off position, the shutter won't release and the LEDs won't turn on.
2. Self-timer switch. On main-switch block. Fig. I 7. Sliding the main switch all the way forward connects battery power to the circuit and closes the self-timer switch. IC1 then delays the mirror-release signal for 12 seconds.
3. SWS. Light-measuring switch. Top contact on shutter-speed PC board, tig. I. Pushing the release button part way moves the SWS contact against the center ground contact. The LEDs turn on.
4. SWR. Release switch. Bottom contact on shutter-speed PC board. Fig. I. Fully depressing the release button moves the center ground contact against the release-switch contact. lCI then supplies the release signal to IC2.
5. Timing switch. In shutter block, Fig. 21. The timing switch is closed with the shutter cocked, enabling the release. When the 1st curtain starts to run. the timing switch opens to start the timing cycle.
6. Wind-completion switch. Bottom of camera, wind side. Fig. 2. During the cocking cycle, the wind-completion switch closes to inhibit the shutter release. The wind-completion switch opens with the shutter fully cocked to enable the release.

7. Memory-lock switch. On front plate, rewind side. Closes when you push the ML button. The LEDs turn on. and the auto exposure remains locked for 10 seconds.

MAGNET LOCATIONS AND FUNCTIONS

1. Release magnet. Hybrid magnet at bottom of mirror box. Fig. 5. Thi- release magnet separates when the release capacitor discharges through its coil to release the mirror.
2. Aperture magnet. Hybrid magnet at wind-lever side of front plate. The aperture magnet separates when the aperture capacitor discharges through its coil to latch the movement of the aperture-control lever and stop the diaphragm.
3. Shutter magnet. Electromagnet in shutter block, Fig. 21. Energized when the release switch closes to hold the 2nd curtain.

BASIC OPERATION

Note: The circuit operation is nearly the same as that in the Super Program and Program Plus. However, since the P3 uses an LED display, the clock only turns on when you push the release button part way.

1. The circuit uses two ICs on the underside of PC board T100: ICI. Timing/control IC on the rewind side. Fig. 6. ICI has the built-in oscillator and supplies the clock signal.

   IC2. Interface and decoder/driver on the wind side. Fig. 6. 1C2 switches the control transistors and drives the LEDs.
2. Turning on the main switch supplies battery voltage to the circuit. When you push the release button part way, SWS closes. Now ICI supplies the clock and SV signals to IC2.
3. IC2 receives the mode and TV information as digital signals from the shutter-speed PC board. The BV and AV signals are analog values input to IC2. When IC2 receives the SWS and clock signals, it turns on the LEDs according to the mode and exposure inputs.
4. When you fully depress the release button, the release switch SWR closes. ICI then checks the timing switch in the shutter block. If the timing switch is closed — and the wind-completion switch is open — ICI supplies the release signal to IC2. If the self-timer switch is closed. IC I delays the release signal for 12 seconds.
5. When IC2 receives the release signal from ICI, it turns on the release transistor. Fig. 16. The release capacitor, Fig. 3. discharges through the coil of the release magnet. The release magnet separates, releasing the mirror.
6. As the diaphragm closes, the optical encoder supplies the feedback signal to IC2. The count from the optical encoder is compared to the count stored in ICI memory. When the counts are equal. IC2 stops the diaphragm by turning on the aperture transistor. Fig. 16. The aperture capacitor then discharges through the coil of the aperture magnet. The aperture magnet separates, slopping the aperture-control lever
7. Closing the release switch SWR also energizes the shutter magnet in the shutter block. IC2 turns on the shutter transistor, Fig. 16, to

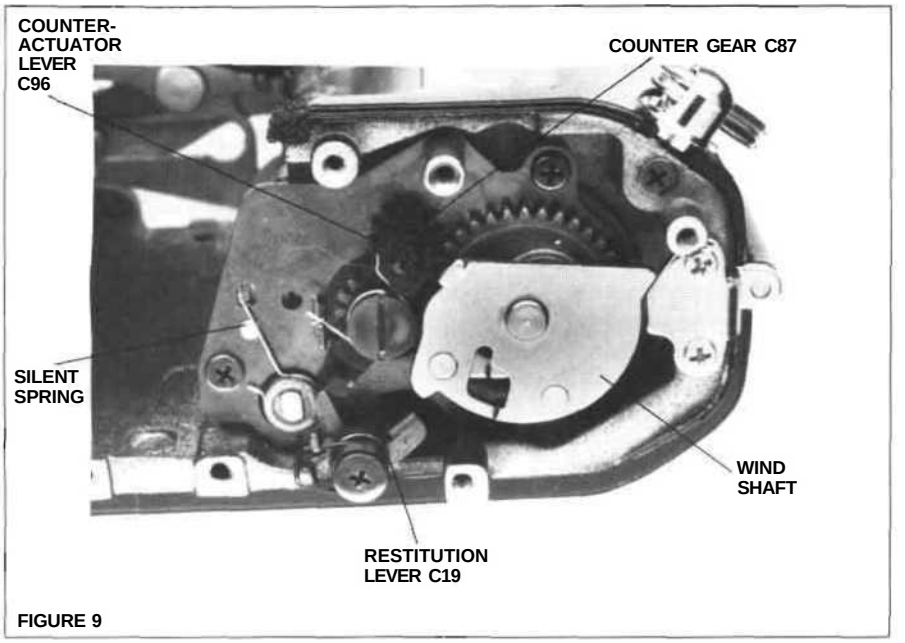


FIGURE 9

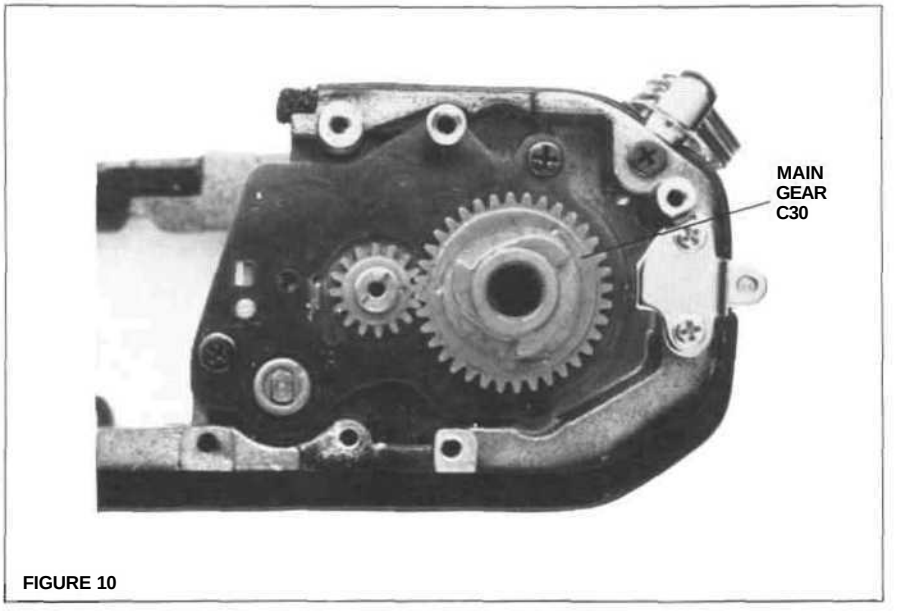


FIGURE 10

switch low the brown magnet lead.

8. The mirror mechanically releases the shutter. As the first curtain runs, it opens the timing switch in the shutter block. ICI now starts timing the exposure. To end the exposure. IC'l commands IC'2 to shut off the shutter magnet. IC2 turns off the shutter transistor. The brown magnet lead switches high, and the shutter magnet releases the second curtain.
9. As you cock the shutter for the next exposure, the wind-completion switch closes. The wind-completion switch clears the counters in ICI and inhibits the shutter release. With the shutter fully cocked, the wind-completion switch opens to enable the shutter-release signal.

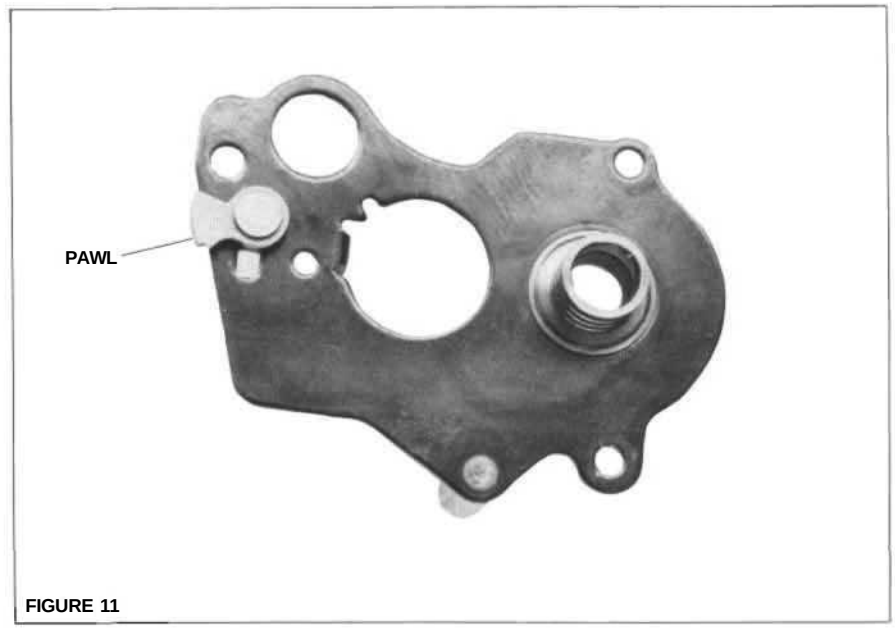


FIGURE 11

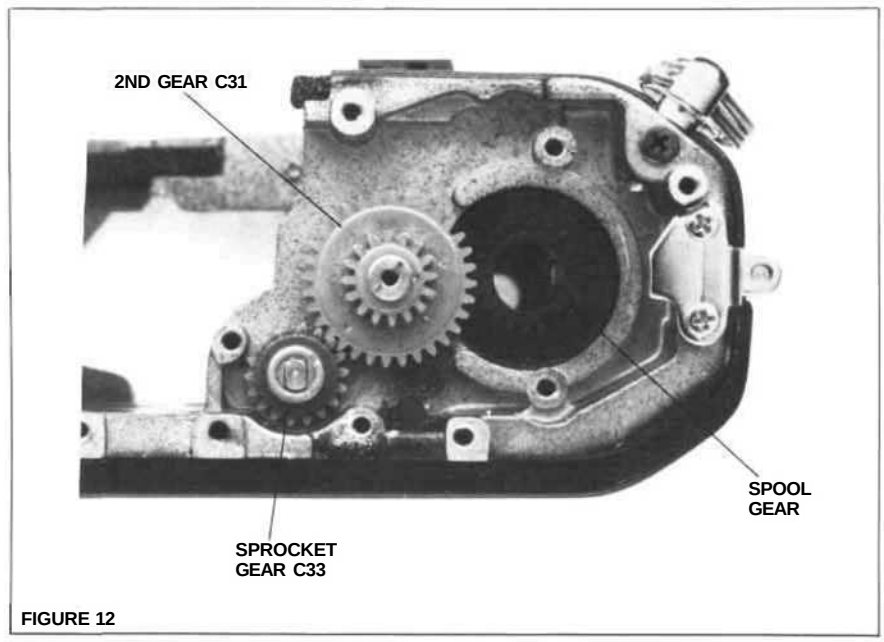


FIGURE 12

DISASSEMBLY HIGHLIGHTS

Settings for disassembly: main switch off. speed knob on flash setting (100) Locations of left-hand threads: wind-lever screw. Fig. I

Sequence:

1 bottom cover (3 screws) — rewind button and batteries loose
2. top cover
   - wind-lever cover (1 screw, underside)
   - wind lever (left-hand screw)

Note: The early style wind-lever screw has spanner notches. The current style. Fig. 4. is a crosspoint screw. The wind-lever screw has locking agent on the threads. Use acetone or the heat from a soldering iron to soften the locking agent.

- top-cover nut around wind shaft
- rewind knob (screw at lop) -— rewind shall loose
- 5 top-cover screws (the 2 screws at the front of the camera have long shoulders)
- lift the top cover and unsolder the black wire from PC board TI00 and the gray wire from the shutter-speed PC board. Fig. 21.

3. remove handgrip leather
4. remove handgrip (crosspoint screw and large minus-head plug)
5. remove right and left front leather
6. unsolder 1 I wires from top of camera. Fig. 21 —
   - 4 shutter-block wires (white, red. and brown from PC board T100. gray from shutter-speed PC board)
   - 5 DX-block wires from PC board T100 (pink, green, yellow, brown, purple)
   - wind-eompletion-swilch wire from PC board T100 (orange)
   - battery-box wire from PC hoard T100 (red)
7. pull red, white, and brown shutter-block wires to wind-lever end of camera (the wires pass to the front of the pentaprism)
8. remove screws holding shutter-speed PC board (4 screws in early models. 2 screws in later models)
9. remove 2 screws holding main switch
10. cock shutter
11. remove 2 upper mirror-box screws (I on either side of eyelens)
12. remove 4 front-plate screws
13. lift out fronl-plaie/mirror-box assembly
14. remove shutter-speed base plate. Fig. 7 (3 screws in early models. 2 screws in later models)
15. remove shutter block (2 screws at top of curtain unit. 1 black zinc screw at back of aperture)

Reassembly highlights:

1. Before you replace the mirror

box, cock the shutter. The mirror box should be released with the mirror down.

2. To check the assembly after you install the mirror box, advance the wind lever to charge the mirror. Release the mirror by pushing the release-magnet armature toward the front of the camera — work through the cutout at the bottom of the camera. Fig. 2.
3. Before installing the lop cover, push the main switch to ihe off position (toward the back of the camera. Fig. I). Turn the shutter-speed brush fully clockwise (flash-speed setting).

Sequence to remove flex (PC board T100):

Note: The mirror box doesn't have to be removed. If the mirror box is still installed, remove the screws holding the main switch and the screws holding the shutter-speed PC board. Remove the shutter-speed base plate. Fig. 7, to reach the LED display.

1. remove screw and separate LED display from mirror box
2. unsolder all wires from flex except 3 wires from photocell board (2 black. I red)
3. remove 2 hot-shoe contact pieces. Fig. 3
4. lift photocell board clear of eyelens frame
5. remove PC board TIOO (held by double-sided tape on each IC. Fig. 6)

Reassembly highlights:

After you replace the flex, check the alignment of the LED display. If the mirror box is installed, check the alignment before you replace the shutler-speed base plate. Connect a jumper between the ground land on the shutter-speed PC board and the camera body. You can then turn on Ihe LFDs by closing SWS. If the mirror box is removed, you can power the circuit as described in "Circuit Tests." P3. Loosen the screw and shift the LED display for adjustment.

Sequence to disassemble transport:

1. remove wind lever
2. disconnect counter-dial spring from counter-retainer nut. Fig. 7
3. unscrew counter-retainer nut
4. remove counter dial together with counter-dial spring
5. remove winding seat. Fig. 7 (3 screws — the long screw goes to the back of the camera)

Note: The wind-lever shaft (click-cam assembly) is loose. A spring washer fits over the shaft (between the click cam and Ihe winding seat).

6. remove screw connecting shutter-charge lever to ratchet-wheel post. Fig. 2
7. disconnect shutter-charge lever from ratchet wheel
8. remove brass collar from ratchet-wheel post

Note: The brass collar sits shoulder up. The shutter-charge lever then fits over the shoulder.

9. remove winding-guide plate assembly. Fig. 2 (3 screws — short screw goes to front of camera)
10. remove screw and lift aside wind-completion switch. Fig. 2 (not necessary to unsolder wire)
11. remove transport latch. Fig. 2 (E-clip — disconnect the spring from the transport latch: Fig. 8 shows the location of the spring)
12. remove ratchet wheel. Fig. 2 (screw and washer)

Note: The return spring hooks against the edge of the ratchet wheel. Fig. 2. As you lift out the ratchet wheel, allow the spring to unwind (partial turn). You can leave the return spring in the camera body. Fig. 8: one end of the return spring fits under a lip on the post.

13. lift out the wind shaft. Fig. 9

Note: The main gear. Fig. 10, normally stays with the wind shaft.

14. disconnect restitution-lever spring. Fig. 9, from body casting
15. remove restitution lever (screw, spring, post, and lever)
16. disconnect spring of counter-actuator lever. Fig. 9. from lab on lop mechanism plate
17. remove counter-actuator lever (remove screw — loose spring and washer on top of counter-aciuator lever) — the counter gear can now be separated from the counter-actuator lever
18. remove silent (ratchet) spring. Fig. 9
19. remove top mechanism plate (3 screws — countersunk screw goes at back corner, shoulder screw goes toward center of body)
20. remove 2nd gear. Fig. 12 (minus-head screw)
21. lift out sprocket gear. Fig. 12
22. lift out spool gear. Fig. 12

Note: To remove the sprocket or take-up spool, remove the bottom mechanism plate.

Sequence:

1. remove white plastic sprocket latch (R lever). Fig. 8 (E-clip, spring)
2. unscrew nut above sprocket hook. Fig. 8

Note: Hold up the sprocket hook (sprocket-engaged position). Also hold the sprocket. Then use a 3mm box driver to unscrew the nut.

3. unscrew sprocket hook
4. remove bottom mechanism plale (3 screws)
5. remove take-up spool (note loose plastic cap that fits over lower end of spool)
6. remove sprocket shaft

Note: A pin on the side of the sprocket shaft fits within the sprocket. Hold the sprocket and turn the sprocket shaft. When the pin aligns wilh the notch at the bottom of the sprocket, you can lift out the sprocket shaft.

7. remove sprocket

Note: The sprocket spring, sandwiched by two washers, sits inside the sprocket. To remove the spring, take off ihe sprocket key (lower end of sprocket).

Reassembly highlights, bottom mechanism plate:

1. Seat the take-up spool and ihe sprocket from the back of the camera. The sprocket key (insert with notch) faces the bottom.
2. Seat the sprocket shaft, passing its pin into the notch at the bottom of the sprocket. Hold down the sprocket shaft and turn it a partial turn. The sprocket shaft then stays in place.
3. Replace the bottom mechanism plate.
4. Screw on the sprocket hook.
5. Replace the R lever (sprocket latch).
6. After you complete the reassembly of ihe transport, adjust the position of the sprocket hook. Hold the wind lever in the fully advanced position. Then turn the

sprocket hook to obtain the space shown in Fig. 13. Hold up the sprocket hook (sprocket-engaged position) as you screw on the nut. Don't tighten the nut so much that it changes the position of the sprocket hook. Rather, after screwing down the nui and rechecking the adjustment, lock the nut with a dab of cement. Check the sprocket-hook adjustment three times to make sure the space gap is correct.

Reassembly highlights, gear timing for transport:

1. Seat the spool gear with its two slots over the two brass tabs inside the top of the take-up spool.
2. Turn the upper end of the sprocket shaft until its two flat sides are parallel to the ends of the body casting.
3. Seat the sprocket gear with its timing mark (slot at top) in a 1 o'clock position. Fig. 12.
4. Replace the 2nd gear with its timing punch mark (lower gear section) aligned with the timing mark on the sprocket gear. The other punch mark on the 2nd gear (upper gear section) now points to the spool gear. Fig. 12.
5. Position the pawl on the underside of the top mechanism plate as shown in Fig. 11.
6. Seat the top mechanism plate and replace the screws. Then swing the pawl clockwise until it's against the 2nd gear.
7. Replace the silent spring. Fig. 9.
8. Seat the main gear with any one of its 3 punch marks aligned with the punch mark on the 2nd gear. Fig. 10.
9. Seat the wind shaft as shown in Fig. 9. Hold aside the wind-shaft pawl until it seats against the outer edge of the main-gear cam.
10. Scat the counter-actuator lever with the counter gear. Fig. 9. With the counter-actuator lever parallel to the ends of the body casting, the pie-shaped cutout of the counter gear should face the rewind end of the body. Fig. 15. To change the timing, lift the counter-actuator lever and turn the counter gear.
11. Replace the restitution lever. Fig. 9, the wind-lever shaft, and the winding seat.
12. From the bottom of the camera, turn the wind shaft fully counter-clockwise before replacing the ratchet wheel. Hook the upper end of the return spring against the edge of the ratchet wheel. Then turn the ratchet wheel clockwise as you seat it over the wind shaft.
13. Seat the counter dial. Turn the counter dial fully counterclockwise to its stop. Screw on the counter-retainer nut.
14. Hook the upper end of the counter-dial spring to a slot in the counter-retaining nut. Use a slot that's around 90 degrees from the resting position of the spring end. Cement the upper end of the counter-dial spring to the counter-retaining nut.

REVISED SECTIONS

1. The current version of the camera has a cable-release socket 0-A162 (front, rewind side). A blue wire connects the cable-release socket to PC board TI00. Fig. 21. If the camera has the version of PC board TI00 shown in Fig. 21 — but doesn't have the cable-release socket — the blue-wire land is empty. Shorting across the cable-release socket (or shorting the blue wire to ground) releases the mirror. To add the cable-release socket, the front plate was changed (threaded hole added).

   old-style front plate — A100
   new-style front plate — A100-0I

2. When Pentax added the cable-release socket, they also changed the focusing screen. The new-style Fresnel has a rectangular microprism focusing aid: the old style has a round microprism around the split-image focusing aid. Both styles are supplied.

   old-style Fresnel — 24500-L2
   new-style Fresnel — 25302-L2

3. The LED block and the PC board TI00 have been revised. In the original design, the flex-connector posts are on the LED block; the threaded post for the nut is toward the back of the camera. In the new style, the flex-connector posts are on PC board T100; the threaded post for the nut is toward the front of the camera. Fig. 3. The two styles will not interchange (if necessary, replace both the LED block and PC board T100). The old-style LED block and the old-style PC board T100 are no longer supplied.

   new-style LED block — 0100-01
   new-style PC board — T100-01

   Fig. 19 shows the wiring diagram for the early style PC board: Fig. 21 shows the wiring for the new style.
4. The CPU IC on the underside of PC board T00-01 has been revised to improve the operation of the memory-lock switch (see, "Operating Instructions" — #9). You can identify the 1C by the markings. Fig. 16.

   old-style IC — M5840A-158
   new-style IC — M5840A-166

5. The wind-lever screw C139 has been changed to a crosspoint head (the old style has spanner notches) to make assembly easier. Only the new style is now supplied.
6. The nut holding the sprocket hook. Fig. 8, has been changed to make assembly easier. The old style has spanner notches. You can use a box driver (3.0mm) to remove the new style. Fig. 8. Only the new style is now supplied.

TROUBLESHOOTING

Behavior without batteries: shutter won't release

Behavior without lens: only manual mode

Typical current draw:

- release pushed part way (LEDs on) — 7ma
- shutter held open on bulb —30ma

Tips for troubleshooting without disassembly:

1. If the shutter won't release and there's no LED display, try turning the main switch off and then

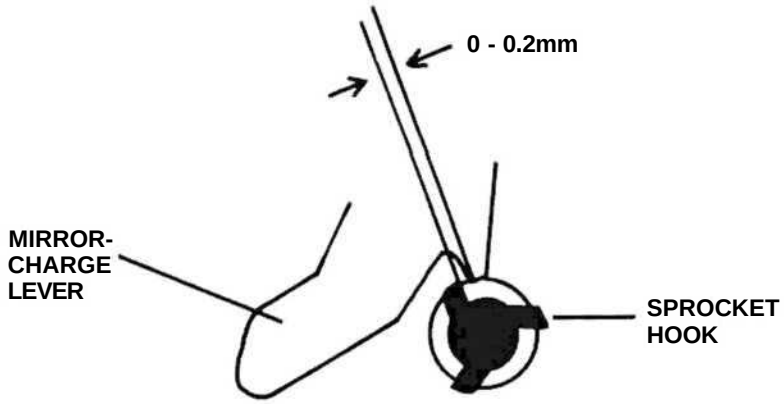


FIGURE 13

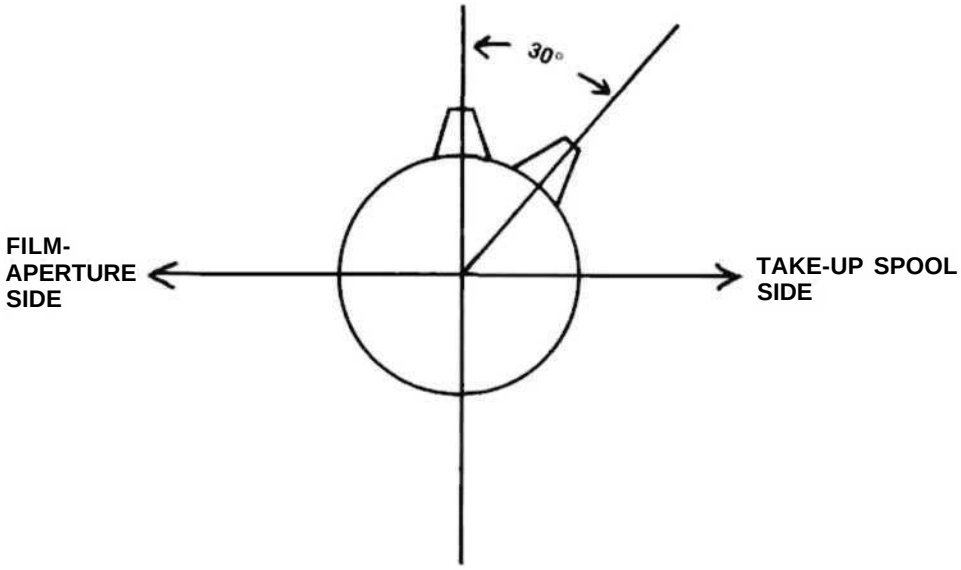


FIGURE 14

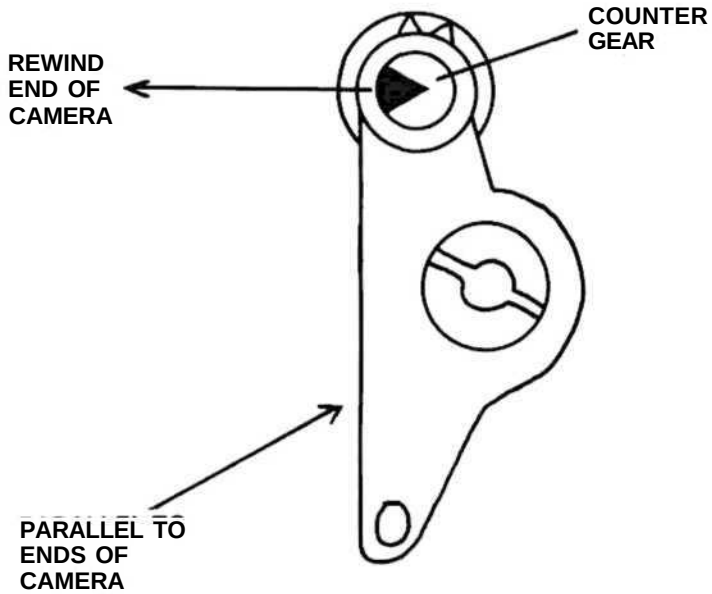


FIGURE 15

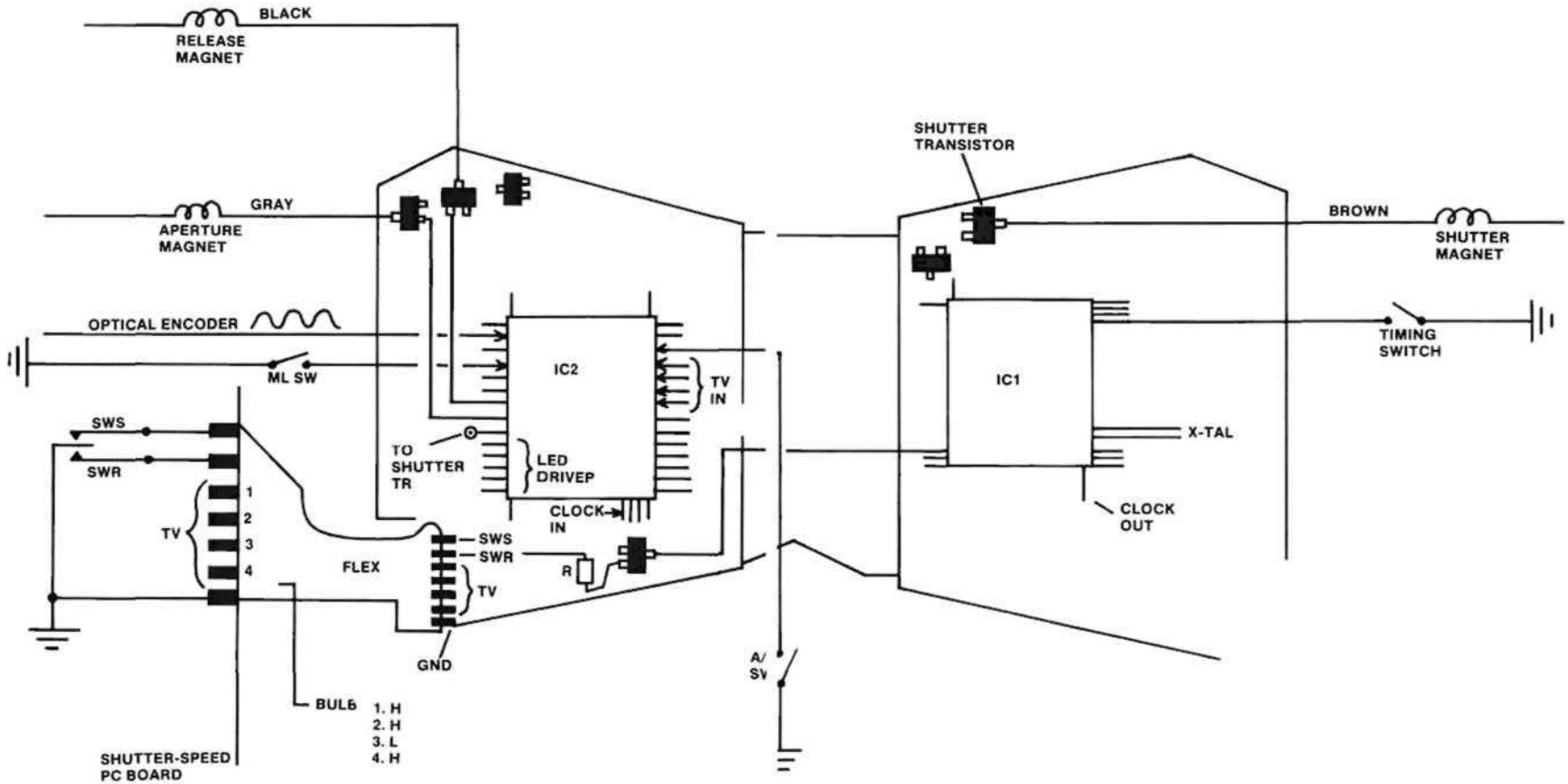

BLACK
RELEASE MAGNET
GRAY
APERTURE MAGNET
OPTICAL ENCODER
ML SW
SWS
SWR
TV
1
2
3
4
FLEX
IC2
TO SHUTTER TR
LED DRIVEP
TV IN
CLOCK IN
SWS
SWR
TV
R
GND
BULB
1. H
2. H
3. L
4. H
SHUTTER-SPEED PC BOARD
SHUTTER TRANSISTOR
BROWN
SHUTTER MAGNET
IC1
TIMING SWITCH
X-TAL
CLOCK OUT
A/
SV

FIGURE 16

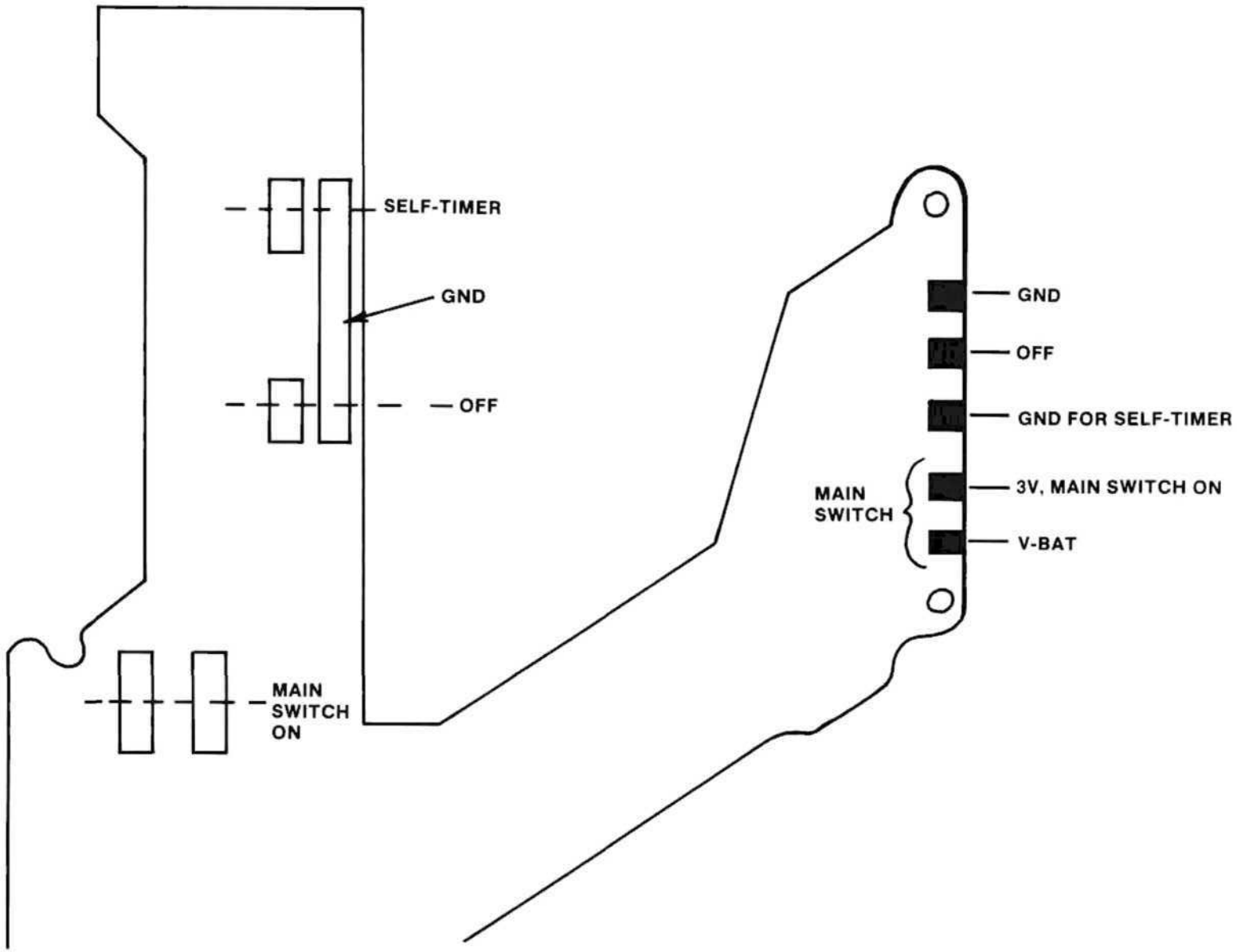
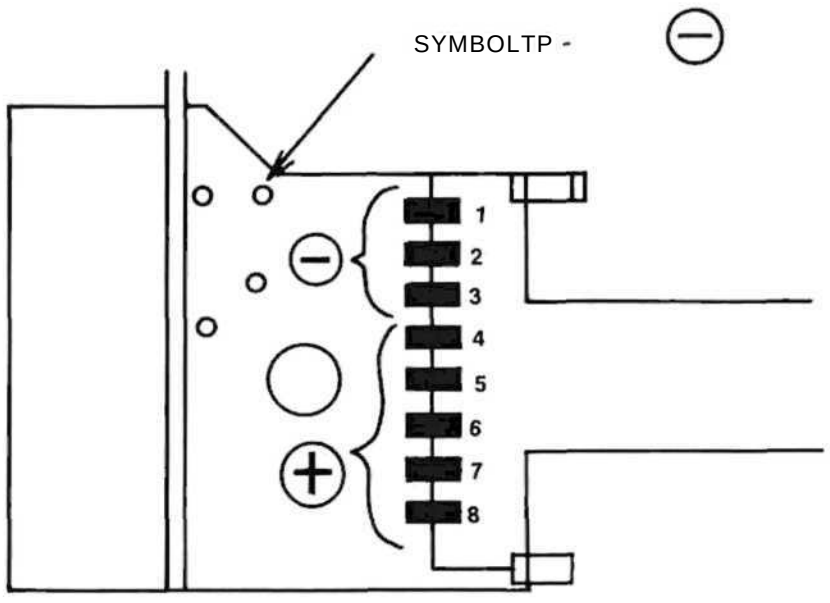


FIGURE 17 **MAIN-SWITCH PC BOARD**



LED PC BOARD

FIGURE 18

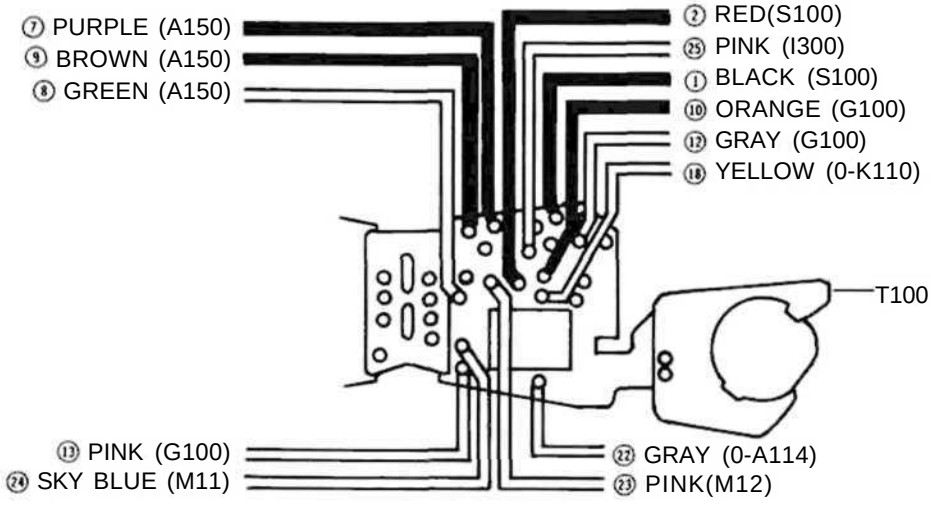


FIGURE 19

on. If the LEDs now turn on when you push the release button part way — and turn off when you fully depress the release button — yet the shutter doesn't release, the problem is probably the release magnet.

2. If the camera won't switch to program mode with the lens at "A," try shorting the A/M lens-mount contact, Fig. 2, to ground. The "P" LED should now turn on when you push the release button part way. If so, the problem is probably poor contact between the lens and the lens mount.

Frequently repaired sections:

Shutter curtains damaged, caused by the operator during film-loading. Replace the shutter block.

CIRCUIT TESTS

1. Optical encoder

   Construct the test circuit shown in Fig. 20. You can then check the optical encoder from the lop of the camera. Fig. 21. Disconnect the sky blue (phototransistor) and orange (LED) wires of the optical encoder. Connect the wires to the test resistors as shown in Fig. 20. Push in the depth-of-field preview lever to rotate the optical-encoder disc. As the disc rotates, you should get a sine-wave signal on the scope. If not, either the phototransistor or the LED may be defective. Replace the diaphragm-control block G100.

2. Dedicated-flash changeover

   a. Set the lens to a manual f/stop.

   b. Select a shutter speed between 1/1000 and 1/125.

   c. Connect 2.4V to the pink-wire hot-shoe contact piece (+), Fig. 21.

   d. Close the light-metering switch. The flash-symbol LED and the "M" LED should turn on.

   e. Select a shutter speed between 1/60 and 1/2. When you now apply voltage to the hot-shoe contact piece and close the light-metering switch, the shutter-speed LED (as well as the "M" LED and the flash-symbol LED) should turn on.

3. Circuit, mirror box removed

   a. Connect a jumper between the ground contact on the shutter-speed PC board and the front plate.

   b. Connect a jumper between the timing-switch land on the PC board TI00, Fig. 21. and the front plate.

   c. Connect 3V between the battery contact on PC board T100, Fig. 21, and the front plate.

   d. Close SWS, Fig. 1. The LED display should turn on (except at the bulb setting) and remain on 10 seconds after SWS opens. With no lens, you should get the "M" LED, the shutter-speed LED that corresponds to the setting of the shutter-speed brush, and the metering LED (the shutter-speed LED that flickers to indicate the proper exposure setting). With the lens installed and set to "A," you should get the "P" LED and the metering shutter-speed LED.

   e. Charge the mirror by pushing forward the mirror-charge lever. Fig. 5.

   f. Close the release switch SWR. The mirror should release and move to the raised position. The LED display should turn off.

   g. The LED display remains off, even after you return the mirror, because of the jumper between the timing-switch land and ground. Momentarily disconnect the jumper. The LEDs should then turn on when you close SWS.

4. PC board T100, removed

   a. Bridge the lands of the main switch. Fig. 17.

   b. Connect hook-up wires to the V-bat (+) and ground lands, Fig. 21.

   c. Apply 3V between the hook-up wires.

   d. Close SWS. The LEDs should turn on and remain on for 10 seconds after SWS opens. The "M" LED and the shutter-speed LED indicating the selected shutter speed should turn on. The "1000" LED should be flickering.

   e. Close the release switch SWR. The LEDs should remain on, but the "1000" LED should stop flickering and glow steadily.

   f. Short the A/M land (green wire. Fig 21) to ground and close SWS. The "P" LED should turn on.

   g. Short the timing-switch land (white wire. Fig. 21) to ground and close SWS. The LEDs should turn on. Now close the release switch. The LEDs should turn off.

5. LED display, removed

   a. Check using a 2.8V power supply. Connect a 300-ohm resistor to one power-supply lead to limit the current through the LEDs.

   b. By touching the positive power-supply lead to one of the terminals labeled "+" in Fig. 18, and then touching the negative power-supply lead to one of the terminals labeled "-" in Fig. 18, you should be able to turn on each of the LEDs individually. The following chart shows which LED should turn on for each combination of power-supply connections:

-LEAD	+ LEAD	LED
3	4	1
3	S	2
3	6	4
3	7	S
2	4	15
2	5	30
2	6	60
2	7	125
1	4	250
1	5	500
1	6	1000
symbol	6	P
symbol	5	M
symbol	7	flash symbol

Troubleshooting steps for specific problems:

I. Shutter won't release, no LEDs
   Battery voltage to circuit
   Check for 3V between ground and the red wires (+), Fig. 21. No

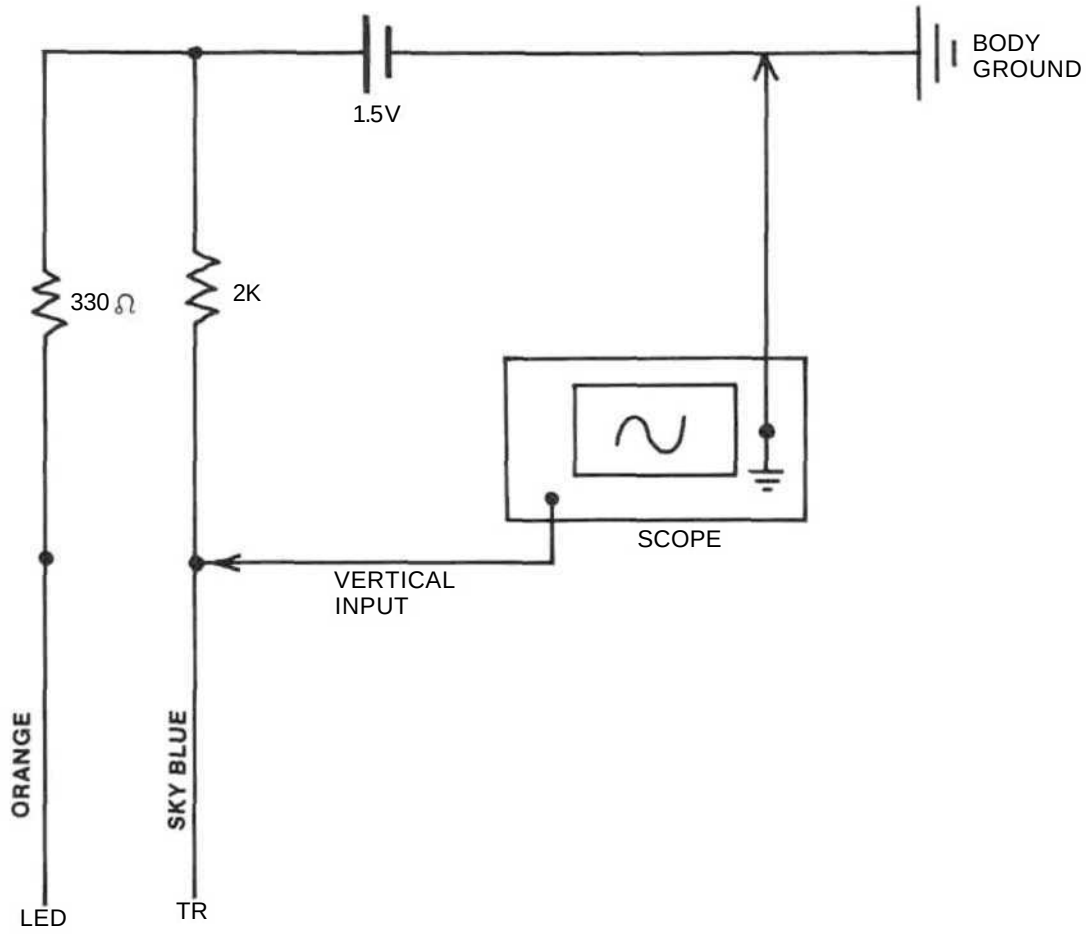


FIGURE 20 **OPTICAL ENCODER TEST CIRCUIT**

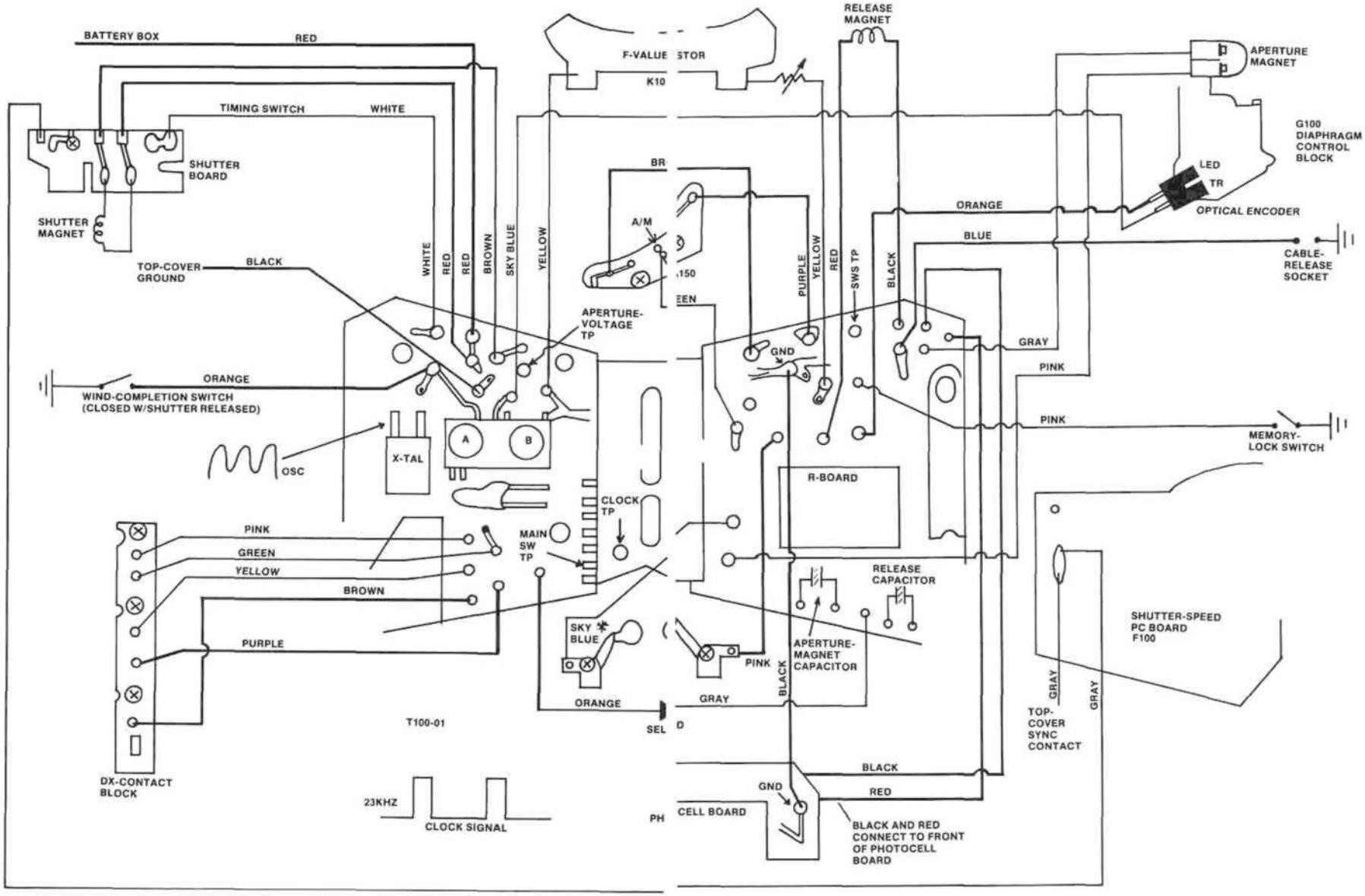

BATTERY BOX
RED
TIMING SWITCH
WHITE
SHUTTER BOARD
SHUTTER MAGNET
TOP-COVER GROUND
BLACK
WHITE
RED
RED
BROWN
SKY BLUE
YELLOW
F-VALUE STOR
K10
RELEASE MAGNET
APERTURE MAGNET
G100 DIAPHRAGM CONTROL BLOCK
LED
TR
OPTICAL ENCODER
ORANGE
BLUE
CABLE-RELEASE SOCKET
A/M
APERTURE-VOLTAGE TP
PURPLE
YELLOW
RED
SWS TP
BLACK
GRAY
PINK
GND
ORANGE
WIND-COMPLETION SWITCH
(CLOSED W/SHUTTER RELEASED)
PINK
MEMORY-LOCK SWITCH
OSC
X-TAL
A
B
R-BOARD
CLOCK TP
MAIN SW TP
PINK
GREEN
YELLOW
BROWN
PURPLE
RELEASE CAPACITOR
SKY BLUE
APERTURE-MAGNET CAPACITOR
PINK
BLACK
ORANGE
GRAY
SHUTTER-SPEED PC BOARD F100
GRAY
GRAY
TOP-COVER SYNC CONTACT
T100-01
DX-CONTACT BLOCK
23KHZ
CLOCK SIGNAL
BLACK
RED
GND
CELL BOARD
BLACK AND RED CONNECT TO FRONT OF PHOTOCELL BOARD

FIGURE 21

voltage — battery box or wiring.

Main switch

With the main switch in the on position, check for 3V at the main-switch IP, Tig. 17. No voltage — poor contact in the main switch or poor solder between the main-switch flex and PC board T100. Fig. 17. Or short between the main-switch connections. Fig. 17. and close SWS. If the LEDs then turn on, the problem is poor contact in the main switch.

Ground to shutter-speed PC board

Check for a loose ground screw, Fig. 3.

Oscillator

Close SWS and check for the sine wave at cither lead of the crystal. Fig. I. No signal — poor solder to crystal, crystal defective, or 1CI defective.

Clock

Close SWS and check for the clock signal at the clock TP, Fig. 21. No signal — IC' I defective.

!. Shutter won't release, LEDs operate

Release switch SWR

Check at the SWR TP. Fig. 3. The TP should connect to ground with the release switch closed. Or short the SWR TP to ground. If the shutter then releases, the problem is poor contact in the release switch or poor solder between the shutter-speed flex. Fig. 16, and PC board T100.

Release magnet, release capacitor

Check if the LEDs turn off when you close the release switch and won't again turn on until you turn the main switch off and then on. Short the black lead of the release magnet, Fig. 21, to ground. If the shutter then releases, the release magnet and the release capacitor arc o.k. If the shutter doesn't release, check the release magnet between the red and black leads. Fig. 21. Approximate coil resistance — 12 ohms. Also check for a dirty release-magnet interface. You can check the release capacitor. Fig. 3. by substituting a 47 microfarad capacitor.

Wind-completion switch

With the shutter cocked, check the voltage at the orange wind-completion-switch wire, Fig. 21. The voltage should be high. If you measure 0V, the wind-completion switch isn't opening or the orange wire is pinched.

Timing switch

With the shutter cocked, check continuity between the white wire (rewind side of PC board TI00) and ground. You should measure direct continuity. If not, check the liming switch, Fig. 21. for poor contact.

3. LEDs won't turn on when you push the release button part way, but do turn on when you release the shutter

SWS

Check by shorting the SWS TP. Fig. 21, to ground. If the LEDs then turn on, the problem is poor contact in SWS, Fig. 1, or poor solder between the shutter-speed flex and PC board T100, Fig. 16.

4. Diaphragm always stops down fully on program mode

Aperture magnet, aperture-magnei capacitor

Cock the shutter and short the gray lead of the aperture magnet. Fig. 21. to ground. You should hear a click as the aperture magnet separates. When you then release the shutter, the diaphragm should remain fully open. No click — check the aperture-magnet coil between the gray and pink wires. Fig. 21. Approximate coil resistance — 16 ohms. You can check the aperture capacitor. Fig. 3. by substituting a 47 microfarad capacitor.

Optical encoder

See, "Circuit Tests" — #1.

A/M switch

Check the LED display with the lens at "A." Ifthe"P"LED doesn't turn on, the problem may be poor contact between the lens and the A/M contact at the front of the lens mount. Check the circuit by shorting the green A/M wire, Fig. 21, to ground. If the circuit is o.k.. the "P" LED will turn on. Still no "P" LED — IC2 defective.

Note: If all tests check o.k.. but the diaphragm still stops down fully, the problem mav be an open aperture-magnet transistor or a defective IC2, Fig. 16. Replace PC board T100.

5. Shutter delivers fastest speed only

Shutter magnet

Short the brown shutter wire. Fig. 21, to ground and release the shutter. The shutter should stay open. If not. the shutter magnet is open or dirty.

PC board T100

Check at the brown magnet wire. Fig. 21, as you release the shutter. The brown wire should switch low when the release switch closes. If not. the shutter-magnet transistor or IC2 may be defective. Fig. 16.

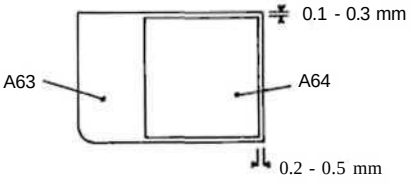
6. LED always shows "1000" (flickering), diaphragm stops down fully on program mode

F-value (aperture) resistor

Check the resistance between the two yellow wires. Fig. 21. At f/8. you should measure 5.9K.

OTHER COMMENTS. PART NUMBERS

1. The flex circuit is supplied only as a complete unit including the photocell board. New-style flex — PC board T100-01.
2. The LED block is supplied separately- See. "Revised Sections" #3.
3. The main-switch block is supplied separately — 1200.
4. The Seiko shutter block is supplied only as a complete unit — O-E000."
5. The spool-film sheet behind the take-up spool is held by double-sided tape. If you do remove the spool-film sheet, it's best to install a new part on reassembly. The drawing here shows the position for installing a new spool-film sheet.



6. Other part numbers:
   - top cover — A300
   - diaphragm-control block (aperture magnet, optical encoder) — G100
   - release-magnet block — S100

Note: Part numbers for the transport arc shown on the illustrations.